

HP 437B

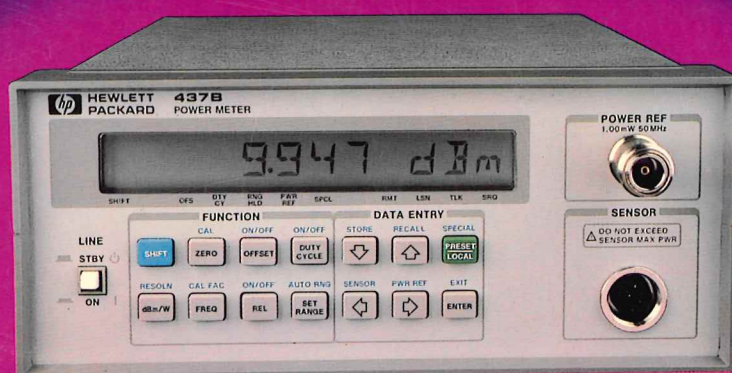
Power Meter

100 kHz to mm-Wave

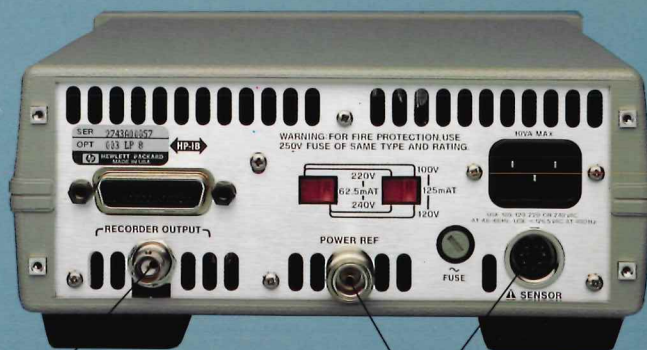
 **HEWLETT
PACKARD**

Exceptional value in a
high-performance power meter

Technical Data



Rear Panel Features



DC recorder output, 0 - 1 volt

Optional rear panel reference oscillator and sensor input for convenience and versatility



- SPECIAL

Access the Cal Factor vs. Frequency tables, limits, HP-IB address, automatic or manual filtering, and internal performance tests.

PRESET/LOCAL

Returns the meter to local control. If already in local, returns the meter to the default condition.

SENSOR CONNECTOR

Sensor input operates with any HP 8480 series sensor, covering from 100 kHz to mm-wave frequencies and from -70 dBm to +44 dBm.

DUTY CYCLE

Duty cycle values between 0.001% and 99.999% can be entered to display a peak power representation of measured power.

SENSOR

Selects from up to 10 cal factor versus frequency tables corresponding to specified sensors.

PWR REF

Turns on the 1 mW, 50 MHz reference oscillator used for accurate, repeatable sensor calibration.

STORE/RECALL

STORE/RECALL
Store and recall up to
10 instrument states.

ENTER

ENTER
When used with arrow keys, allows convenient entry of alphanumeric values.

Designed for ATE Applications

Designed for ATE systems and demanding semiautomated bench-top measurements, the HP-IB programmable HP 437B Power Meter makes fast, accurate and reliable single-channel power measurements.

Only 3½ inches high and half-rack wide, the HP 437B minimizes the use of critical rack space in ATE systems. With a measurement speed twice as fast as that of the industry-standard HP 436A, powerful programming capability, state-of-the-art accuracy and compact system design, the HP 437B lets you measure your test signal with speed, precision and confidence.

Shorten Your Software Development Cycle

Programming the HP 437B is as easy as pushing the corresponding front panel keys. All the meter controls can be automated by using simple, two-letter mnemonic codes. Combining different codes into compact program statements is also simple. The HP 437B internal microprocessor ensures that no matter what the timing requirements, strings of commands execute flawlessly, eliminating the need for redundant program lines and self-checking loops.

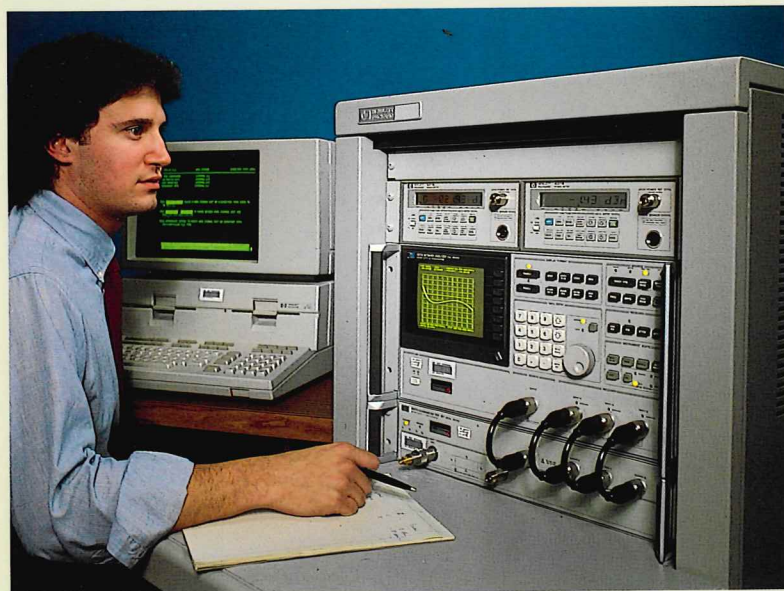
The HP 437B has complete interrupt capability with serial poll and service request that provide the most efficient use of computer time in large test systems. The SRQ byte has provision for alerting the controller when:

- Data is ready.
- Calibration and zeroing is done.
- An entry error has occurred.
- A measurement error has occurred.
- The power level is over or under limits.

Use of these features allows optimization of controller capability for maximum throughput in ATE systems.

Maximize Your Up Time

The very high calculated mean time between failures (MTBF) of 120,000 hours will keep your system up and running. Rigorous environmental testing verifies this high MTBF, while excellent EMI performance qualifies the HP 437B for your most critical applications. Should the HP 437B ever fail, power-on self-tests can isolate a problem to the board level within minutes, while the simple mechanical design provides easy access for calibration and troubleshooting. Backed by HP's worldwide network of service and part centers and a low-cost optional 3-year warranty, the HP 437B will provide you with reliable performance, minimum cost of ownership and exceptional system uptime.



Power-on self-tests and modular design make servicing quick and easy.

Customize your measurement capability with our complete family of precision power sensors.

Minimize Your Measurement Uncertainty

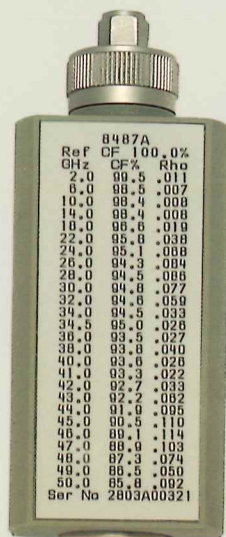
A power meter's overall performance depends heavily on its sensors. They determine frequency coverage, dynamic range and measurement accuracy. With the HP 437B your investment in HP 8480 series power sensors is secure. This family of sensors provides extraordinary accuracy, stability and SWR over a wide range of frequencies (100 kHz to 50 GHz) and power levels (-70 to +44 dBm).

Low SWR: The HP 8481/2/3/5A/6A/7A series of sensors use a very small silicon monolithic thermocouple as the sensing element, which enables the sensors to have a very low SWR even at mm-wave frequencies. This reduces mismatch uncertainty, usually the largest single source of error in power measurements. The HP 8484A/6D use Schottky and advanced Planar Doped Barrier diode technology for high sensitivity measurements while still maintaining excellent SWR.

Individually Calibrated: Each sensor supported by the HP 437B is individually calibrated and traceable to the U.S. National Bureau of Standards. The calibration factor is printed on the sensor for easy reference. This Cal Factor can be entered into the meter to compensate for sensor efficiency at any frequency. The availability of ten Cal Factor versus frequency tables in the HP 437B makes it easy and convenient to use different sensors without the need of entering the cal factor for each measurement set-up.

114 dB of Power Measurement Range, from 100 kHz to 50 GHz

Coaxial RF and microwave sensors as well as coaxial or waveguide millimeter-wave sensors can be combined to obtain frequency coverage from 100 kHz to 50 GHz. Most power measurements fall in the 10 MHz to 18 GHz range of the HP 8481 and HP 8484A sensors. For measuring lower frequency signals, like IF's, the HP 8482 series covers 100 kHz to 4.2 GHz. If you need to go above 18 GHz, the HP 8485A covers from 50 MHz to 26.5 GHz. Or use our HP 8486 family of sensors to cover waveguide millimeter-wave frequency bands. The HP 8487A covers the entire 50 MHz to 50 GHz frequency range using a single 2.4mm input connector.



Your sensor calibration data can be conveniently entered into the HP 437B memory.



HP's new sensors provide coaxial and waveguide power measurement capability up to 50 GHz.

Combining HP 8480 series power sensors you can get 114 dB dynamic range, from -70 to $+44$ dBm. We offer low, mid and high sensitivity sensors to satisfy your most demanding applications.

25 Watt Sensors 0 to $+44$ dBm
(1 mW to 25W)

Ideal for transmitter test, these sensors handle pulses up to 500W peak. The Cal Factors include attenuator characteristics for improved accuracy.

3 Watt Sensors -10 to $+35$ dBm
(100 μ W to 3W)

General purpose medium power measurements. Handles pulses up to 100W peak.

100 mW Sensors -30 to $+20$ dBm
(1 μ W to 100 mW)

General purpose measurements to millimeter-wave frequencies. The 75-ohm HP 8483A is compatible with television and telephone transmission lines.

High Sensitivity Sensors -70 to -20 dBm (100 pW to 10 μ W)

Excellent for accurate measurements of true RMS power at very low power levels. 40 dB of overrange protection prevents accidental burnouts. These sensors are furnished with the HP 11708A 50 MHz reference attenuator for precise calibration with the power meter.

This extensive and growing family of power sensors, gives you the most accurate and complete power measurement solution available.



HP's complete power sensor family satisfies your most demanding applications.

Sensor Specifications

25 Watt Sensors 1 mW to 25W (0 to +44 dBm)

HP Model	Frequency Range	Maximum SWR	Power Linearity ¹	Maximum Power	Connector Type
8481B	10 MHz – 18 GHz	10 MHz – 2 GHz: 1.10 2 – 12.4 GHz: 1.18 12.4 – 18 GHz: 1.28	+35 to +44 dBm ±4%	0 – 35°C: 30W average ² 35 – 55°C: 25W average 0.01 – 5.8 GHz: 500W peak 5.8 – 18 GHz: 125W peak 500W · μs per pulse	N(m)
8482B	100 kHz – 4.2 GHz	100 kHz – 2 GHz: 1.10 2 – 4.2 GHz: 1.18			N(m)

3 Watt Sensors 100 μW to 3W (–10 to +35 dBm)

8481H	10 MHz – 18 GHz	10 MHz – 8 GHz: 1.20 8 – 12.4 GHz: 1.25 12.4 – 18 GHz: 1.30	+25 to +35 dBm ±5%	3.5W average, 100W peak 100W · μs per pulse	N(m)
8482H	100 kHz – 4.2 GHz	100 kHz – 4.2 GHz: 1.20			N(m)

100 mW Sensors 1 μW to 100 mW (–30 to +20 dBm)

8485A	50 MHz – 26.5 GHz	50 – 100 MHz: 1.15 100 MHz – 2 GHz: 1.10 2 – 12.4 GHz: 1.15 12.4 – 18 GHz: 1.20 18 – 26.5 GHz: 1.25	+10 to +20 dBm +2, –4%	300 mW average, 15W peak 30W · μs per pulse	APC-3.5mm (m)
8481A	10 MHz – 18 GHz	10 MHz – 30 MHz: 1.40 30 – 50 MHz: 1.18 50 MHz – 2 GHz: 1.10 2 – 12.4 GHz: 1.18 12.4 – 18 GHz: 1.28			N(m)
8482A	100 kHz – 4.2 GHz	100 – 300 kHz: 1.60 0.3 – 1 MHz: 1.20 1 MHz – 2 GHz: 1.10 2 – 4.2 GHz: 1.30			N(m)
8483A (75Ω)	100 kHz – 2 GHz	100 – 600 kHz: 1.80 600 kHz – 2 GHz: 1.18		300 mW average, 10W peak	N(m) 75Ω
R8486A	26.5 – 40 GHz	1.4	+10 to +20 dBm +2, –4%	300 mW average, 15W peak 30W · μs per pulse	Waveguide Flange UG-599/U
Q8486A	33 – 50 GHz	1.5			Waveguide Flange UG-383/U
8487A	50 MHz – 50 GHz	50 – 100 MHz: 1.15 100 MHz – 2 GHz: 1.10 2 – 12.4 GHz: 1.15 12.4 – 18 GHz: 1.20 18 – 26.5 GHz: 1.25 26.5 – 40 GHz: 1.30 40 – 50 GHz: 1.50	+10 to +20 dBm +2, –4%	300 mW average, 15W peak 30W · μs per pulse	2.4mm (m)

High Sensitivity Sensors 100 pW to 10 μW (–70 to –20 dBm)

8484A ³	10 MHz – 18 GHz	10 – 30 MHz: 1.40 30 MHz – 4 GHz: 1.15 4 – 10 GHz: 1.20 10 – 15 GHz: 1.30 15 – 18 GHz: 1.35	–30 to –20 dBm ±1%	200 mW average 200 mW peak	N(m)
R8486D ³	26.5 – 40 GHz	1.4	–30 to –25 dBm ±4% –25 to –20 dBm ±7%	100 mW average or peak 40 Vdc max.	Waveguide Flange UG-599/U
Q8486D ³	33 – 50 GHz	1.4			Waveguide Flange UG-383/U

¹ Negligible deviation except for those power ranges noted.

² For pulses greater than 30W the maximum average power (P_a) is limited by the energy per pulse (E) in W · μs according to $P_a = 30 - 0.02E$.

³ Includes HP 11708A 30 dB attenuator for calibrating against a 0 dBm, 50 MHz power reference. HP 11708A is factory set to 30 dB ±0.5 dB at 50 MHz, traceable to NBS. SWR <1.05 at 50 MHz.

Specified accuracy and traceability build confidence in your measurement

Mismatch Uncertainty

Optimizing your measurement accuracy depends on knowing the sources of error in the measurement. Most of these uncertainties are expressly defined as power meter specifications. But mismatch uncertainty, a key error often overlooked, must be calculated independently.

Table 1 lists all significant uncertainties in absolute power measurements along with suggestions for reducing these uncertainties. As the table shows, mismatch

uncertainty is usually the largest single source of error in power measurements. For example, if the output of a microwave source has a 1.5 SWR at 2 GHz and the power sensor also has a 1.5 SWR, the maximum mismatch uncertainty will be $\pm 8\%$. The way to reduce this error (without a complicated vector analysis), is to use a sensor with lower SWR. An HP 8481A sensor has less than 1.10 SWR at 2 GHz. As shown in Figure 1, this reduces the mismatch uncertainty to only $\pm 1.9\%$ when measuring the same source.

Table 1.
Uncertainties in Power Measurements

Source of Error	Typical Value	Reduced to	Reduce Error by
Mismatch	$\pm 1.8\%$	$< \pm 0.1\%$	Tuning at each frequency
Calibration Factor Uncertainty	1.5 – 5.5%	$< 2.7\%$	Special calibration by standards lab
Power Reference Uncertainty	1.2%	$< 0.7\%$	"
HP 11708A Calibration Pad (HP 8484A, HP R/Q8486D)	1.1%	$< 0.5\%$	"
Instrumentation Uncertainty*	0.5%	$< 0.5\%$	Use high resolution DVM on recorder output
Zero Set	0.2%	$< 0.2\%$	"
Noise	0.2%	$< 0.1\%$	Increase averaging
Power Reference Mismatch Uncertainty	0.2%	$< 0.2\%$	Tuning

* Add sensor power linearity error (see sensor specifications) on top range only.

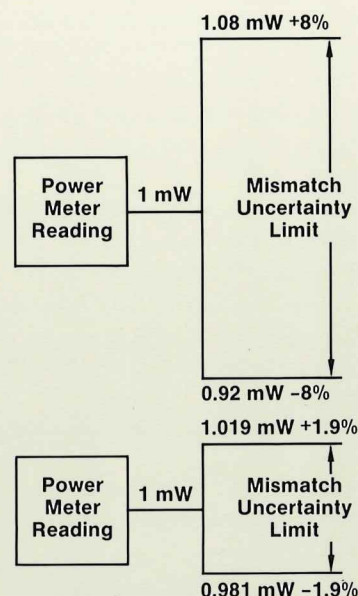


Figure 1. Limits of mismatch uncertainty when source SWR is 1.5 and sensor SWR is 1.5 and improved mismatch uncertainty limits when source SWR is 1.5 and sensor SWR only 1.1.

Traceability to NBS

HP's measurement of calibration factor is directly traceable to the U.S. National Bureau of Standards (NBS). The uncertainty in this calibration factor, given in Table 3, is therefore your link to NBS. By adding this uncertainty to the other sources of error listed in Table 1, you can define your measurements in terms of primary standards with statements such as "1.23 mW $\pm 4.2\%$, traceable to NBS."

Table 2.
Root Sum of Squares (RSS) Uncertainty of the Cal Factor Data Printed on the Power Sensor

RSS Uncertainty (%)																	
Freq.	Freq.								Freq.								
(MHz)	8482A	8482B	8482H	8483A	(GHz)	8481A	8481B	8481H	8484A	8485A	8487A	(GHz)	R8486A	Q8486A	R8486D	Q8486D	8487A
0.1	± 1.3	± 2.8	± 1.6	± 1.5	1.0	± 1.6	± 3.0	± 1.9	± 1.9	—	—	26.5	3.1	—	3.0	—	2.1
0.3	1.2	2.8	1.6	1.4	2.0	1.4	3.1	1.7	1.8	± 2.1	1.6	28	3.2	—	3.2	—	2.3
1.0	1.2	2.8	1.6	1.4	4.0	1.5	3.1	1.8	1.8	—	—	30	3.1	—	3.0	—	2.1
3.0	1.2	2.8	1.6	1.4	6.0	1.5	3.1	1.8	1.8	2.3	—	33	3.1	4.0	3.0	4.2	2.3
10.0	1.3	2.8	1.6	1.6	8.0	1.7	3.2	2.0	2.0	—	—	34.5	3.1	4.0	3.0	4.2	2.1
30.0	1.4	2.8	1.7	1.6	10.0	1.9	3.3	2.2	2.2	2.7	1.8	37	3.0	4.0	3.0	4.2	2.3
50.0	0(ref)	2.7	0(ref)	0(ref)	12.0	2.1	4.1	2.4	2.8	—	—	40	3.1	4.0	3.0	4.2	2.6
100.0	1.6	3.3	1.9	2.0	14.0	2.6	4.1	2.8	3.2	3.2	2.1	42	—	4.8	—	4.9	3.2
300.0	1.6	3.3	1.9	2.0	16.0	2.9	4.2	3.0	3.4	—	—	44	—	5.4	—	5.1	3.6
1000.0	1.4	3.3	1.7	2.0	18.0	3.2	4.3	3.1	3.7	3.6	2.3	46	—	6.0	—	5.5	4.1
2000.0	1.4	3.3	1.7	2.1	22.0	—	—	—	—	3.7	1.8	48	—	6.0	—	5.8	4.5
4000.0	1.5	3.1	1.8	—	26.5	—	—	—	—	4.0	2.1	50	—	5.6	—	6.2	5.0

HP 437B Power Meter Specifications

SPECIFICATIONS describe the instrument's warranted performance over the 0°C to 55°C temperature range. SUPPLEMENTAL CHARACTERISTICS are intended to provide information useful in applying the instrument by giving typical, but nonwarranted, performance standards.

METER

Frequency Range: 100 kHz to 50 GHz, sensor dependent.

Power Range: -70 to +44 dBm (100 pW to 25W), sensor dependent.

Power Sensors: compatible with all HP 8480 series sensors. (see pages 6, 7 and 8).

Dynamic Range: 50 dB in 10 dB steps.

Display Units: Absolute: Watts, dBm. Relative: percent, dB.

Resolution: Selectable resolution of 0.1, 0.01 and 0.001 dB in logarithmic mode; or 1%, 0.1% and 0.01% of full scale in linear mode.

Default Resolution: 0.01 dB; 0.1% of full scale for watts or percent.

Auto Filter Mode: The meter automatically selects the required number of averages for the chosen range and resolution.

Table 3.
Number of Averages vs. Range and Resolution
(for Auto Filter Mode)

		Res 1 (0.1 dB, 1% F.S.)	Res 2 (0.01 dB, 0.1% F.S.)	Res 3 (0.001 dB, 0.01% F.S.)
Range	Highest Power 5	1	1	8
	4	1	1	16
	3	1	2	32
	2	1	8	256
	Lowest Power 1	8	128	128

Accuracy

Instrumentation¹: ± 0.02 dB or $\pm 0.5\%$

In Rel mode: ± 0.02 dB or $\pm 0.5\%$ within measurement range;
 ± 0.4 dB or $\pm 1\%$ outside measurement range.

Zero Set (digital settability of zero)²: $\pm 0.5\%$ of full scale on most sensitive range. Decrease percentage by factor of 10 for each higher range, ± 1 display count.

EMI: Radiated and Conducted Emissions and Radiated and Conducted Susceptibility are within the requirements of RE02, CE03, RS01/03 and CS01/02 called out in MIL-STD-461C, and within the requirements of VDE 0871 and CISPR Publication 11.

METER SUPPLEMENTAL CHARACTERISTICS

Meter noise (% of full scale, constant temperature, range 1, measured over one minute interval, two standard deviations).

Decrease noise by a factor of 10 for each higher range for all sensors and all filters.

HP 8481/2/3/5/6A/7A Sensors

No. of Averages	1	2	4	8	16	32	64	128	256	512
Noise (%)	6	2.4	1.8	.90	.7	.5	.4	.3	.2	.15

HP 8484A Sensor: multiply noise levels by 4 for all filters.

HP R/Q8486D Sensors: multiply noise levels by 6 for all filters.

Zero Drift of sensors (% of full scale, 1 hour, at constant temperature after 24-hour warm up). Decrease percentage by a factor of 10 for each higher range.

HP 8481/2/3/5/6A/7A: $<0.1\%$ of full scale in range 1.

HP 8484A/6D: $<2.0\%$ of full scale on range 1.

Settling Time: (0 to 99% settled readings over the bus). Range HOLD, 10 dB decreasing power step.

No. of Averages	1	2	4	8	16	32	64	128	256	512
Response Time (s)	.10	.15	.25	1.0	1.4	2.2	3.7	6.9	14	27

Default resolution of 0.01 dB, range HOLD, 10 dB decreasing power step.

$<7.0s$ range 1

$<1.0s$ range 2

$<150 ms$ range 3

$<100 ms$ ranges 4-5

Measurement Speed over HP-IB, Free-Running Trigger:
20 readings per second.

Rear Panel Output: Analog 0-1 volt without digital filtering or Cal Factor correction, 1 K Ω Output impedance, BNC connector.

POWER REFERENCE

Power Output: 1.00 mW. Factory set to $\pm 0.7\%$ traceable to U.S. National Bureau of Standards.

Accuracy: $\pm 1.2\%$ worst case ($\pm 0.9\%$ RSS) for one year.

POWER REFERENCE SUPPLEMENTAL CHARACTERISTICS

Frequency: 50 MHz nominal.

SWR: 1.05 maximum.

Front Panel Connector: Type N female.

¹ When operating on Ranges 4 and 5, add the power linearity percentages found in the Power Sensor Matrix on page 7.

² If using the HP 8484A/86D Power Meter Sensors: $\pm 2\%$ of full scale.

POWER METER FUNCTIONS

Set Range: Selects and holds any of the five measurement ranges.

Duty Cycle: Displays peak power representation of measured RMS power for rectangular pulses. The HP 437B accepts duty cycle values ranging from 0.001% to 99.999% and uses the following equation to calculate displayed peak power value:

$$\text{Peak Power} = \frac{\text{Measured RMS Power}}{\text{Duty Cycle}}$$

Offset: Allows power measurement to be offset by -99.99 dB to +99.99 dB.

Your displayed value is derived from the equation:

$$\begin{array}{rcccl} \text{Displayed} & \text{Measured} & & & \text{Duty} \\ \text{Power} & = & \text{Power} & + & \text{Offset} & - & \text{Rel} & - & \text{Cycle} \\ (\text{dB}) & & (\text{dB}) & & (\text{dB}) & & (\text{dB}) & & (\text{dB}) \end{array}$$

Shift Rel, Offset, or Duty Cycle: Allows mode to be toggled ON and OFF without changing the current value.

Store/Recall Registers: Ten store and recall registers are available. Register 01 through 10 store the complete operating state for later recall. Recall register 00 automatically recalls the meter operating state immediately preceding the last change made.

Sensor: Selects which of the ten sensor Cal Factor versus Frequency tables will be used.

Frequency: Allows direct entry of test signal frequency instead of Cal Factor. Uses the Cal Factor/Frequency table for the selected sensor and straight line interpolation between table points, to provide the best cal factor at the entered frequency. The HP 437B accepts frequency entries ranging from 0.0001 GHz to 999.9999 GHz in 100 kHz steps.

Special: Allows access to the following functions:

Sensor Cal Factor/Frequency Tables: Ten Cal Factor versus frequency tables are available. Tables 0 through 7 can hold up to 40 entries, while tables 8 and 9 accept up to 80 Cal Factor/frequency points.

Limits: Measurement boundaries can be set between -299.999 dB and 299.999 dB. The meter will automatically alert you (by displaying Over or Under Limit, or via SRQ) when the power measured is over or under the specified limits.

Averaging: User selectable averaging from 1 to 512 readings (in powers of 2) to smooth noisy measurements.

Preset Default Values: dBm mode, AUTO range, Rel Off, Power Reference Off, Duty Cycle Off, Offset Off, Frequency 50 MHz.

GENERAL

Line Voltage: 100 and 120 Vac, +5% - 10%, 48 - 66 Hz, 360 - 440 Hz; 220 and 240 Vac, +5% - 10%, 48 - 66 Hz.

Power Requirement: 8 watts maximum (10 VA max.)

Weight: net, 2.6 kg (5.9 lbs); shipping 4.5 kg (10 lbs)

Remote Operation: HP-IB; all functions except power switch and HP-IB address.

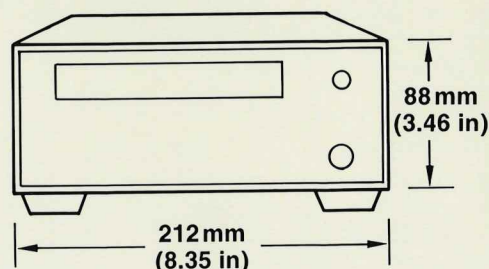
HP-IB Compatibility: SH1, AH1, T5, TE0, L4, LE0, SR1, RL1, PP1, DC1, DT1, C0.

Non-Volatile Memory: Contains meter operating state plus contents of store/recall registers.

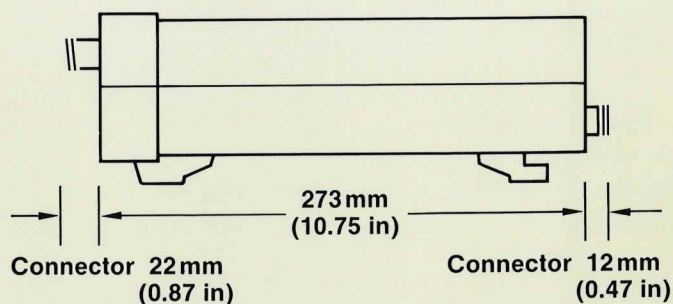
Operating Temperature: 0°C to 55°C.

Storage Temperature: -55°C to 75°C.

Dimensions: 88 mm H x 212 mm W x 273 mm D
(3.46" H x 8.35" W x 10.75" D)



Front View



Side View

Ordering Information

HP 437B POWER METER

Option 002: Supplies a parallel rear panel sensor input. (Power reference oscillator output on front only).

Option 003: Supplies a parallel rear panel sensor input and moves reference oscillator output to rear panel.

Option 004: Delete the HP 11730A sensor cable provided (order desired lengths below).

Option 401: Provides side carrying handle and rear panel standoff feet.

Option 915: Service Manual

Option 916: Extra Operating Manual

Option W30: Two additional years of return-to-HP warranty (3 years of warranty total).

ACCESSORIES FURNISHED

HP 11730A: One 1.5 meters (5 ft) cable for the sensor.

Power Cable: One 2.4 meters (7.5 ft) cable. Mains plug matches destination requirements.

ACCESSORIES AVAILABLE

HP Power Sensor Cable:

- 11730A 1.5 meters (5 ft) sensor cable
- 11730B 3 meters (10 ft) sensor cable
- 11730C 6.1 meters (20 ft) sensor cable
- 11730D 15.2 meters (50 ft) sensor cable
- 11730E 30.5 meters (100 ft) sensor cable
- 11730F 61 meters (200 ft) sensor cable

COMPLEMENTARY EQUIPMENT

HP 11683A Range Calibrator: the HP 11683A verifies the HP 437B meter accuracy and linearity. Outputs corresponding to meter readings of 3, 10, 30, 100, and 300 μ W and 1, 3, 10, 30 and 100 mW are provided. Calibration uncertainty is $\pm 0.25\%$ on all ranges.

Power Requirements: 115 or 230V $\pm 10\%$, 50 - 400 Hz, < 2 W.

Weight: 1.1 kg (2.5 lbs) net, 1.9 kg (4.3 lbs) shipping.

Dimensions: 89 mm H x 133 mm W x 216 mm D (3.5" x 5.25" x 8.5")

POWER SENSORS

HP Model	Dimensions	Weight
8481A 8482A 8483A	30H x 38W x 150mm L (1.19" x 1.5" x 4.13")	Net 2.0 kg (0.38 lb) Shipping 0.5 kg (1 lb)
8485A	30H x 38W x 95mm L (1.19" x 1.5" x 3.75")	Net 2.0 kg (0.38 lb) Shipping 0.5 kg (1 lb)
8481B 8482B	83H x 114W x 248mm L (3.25" x 4.5" x 9.75")	Net 8.0 kg (1.75 lb) Shipping 1.5 kg (3.25 lb)
8481H 8482H	30H x 38W x 149mm L (1.19" x 1.5" x 5.88")	Net 2.0 kg (0.38 lb) Shipping 0.5 kg (1 lb)
8484A	36H x 44W x 133mm L (1.44" x 1.75" x 5.25")	Net 0.4 kg (0.8 lb) Shipping 0.9 kg (2 lb)
8487A NEW	30H x 38W x 94mm L (1.19" x 1.5" x 3.70")	Net 0.14 kg (0.28 lb) Shipping 0.48 kg (1.07 lb)
R8486A Q8486A R8486D NEW Q8486D NEW	30H x 65W x 126mm L (1.19" x 2.56" x 4.96")	Net 0.26 kg (0.53 lb) Shipping 0.66 kg (1.3 lb)

HP 281C PRECISION WAVEGUIDE COAX ADAPTERS

Hewlett-Packard offers a precision line of waveguide/coax adapters to adapt from waveguide systems to your coaxial HP sensor with virtually no degradation in performance. For more information consult the HP 281C technical data sheet.

Model	Freq. Range (GHz)	SWR	Typical Insertion Loss	Connector
X281C	8.2 - 12.4	<1.05	0.08 dB	APC-7
Option 012				N(m)
Option 013				N(f)
P281C	12.4 - 18.0	<1.06	0.1 dB	APC-7
Option 012				N(m)
Option 013				N(f)
K281C	18.0 - 26.5	<1.07	0.12 dB	APC-3.5(f)
Option 012				APC-3.5(m)
R281A	26.5 - 40	<1.13	—	2.4mm(f)
Q281A	33 - 50	<1.17	—	2.4mm(f)

RACK MOUNTING INFORMATION

Configuration	Part Nos. Required
To rack mount one HP 437B	5061-9672
To rack mount two HP 437B's together	5061-9674 5061-9694

OTHER HP POWER METERS



HP 435B: The HP 435B Analog Power Meter is designed to be rugged and cost effective. Simple accurate and reliable, it is well-suited for field or bench use. It is fully portable with an optional battery pack.

HP 436A: The HP 436A Digital Power Meter features accurate, automatic operation. It is widely used in both bench and ATE applications because of its simplicity and proven reliability.

HP 438A: The HP 438A Microprocessor-controlled Dual-channel Power Meter features ratio and difference measurements between its two inputs, and a host of other conveniences to make even your more complex power measurements virtually automatic.

For more information, call your local
HP sales office listed in the telephone
directory white pages. Ask for the
Electronic Instruments Department, or
write to Hewlett-Packard:

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HP 437B Front Panel Features

Actual Size

CAL
Fully automatic sensor calibration.

ZERO
Fully automatic digital zero in all five ranges eliminates zero carryover.

RESOLN
Selectable resolution of 0.1, 0.01, and 0.001 dB puts you in control of the tradeoff between measurement speed and display resolution.

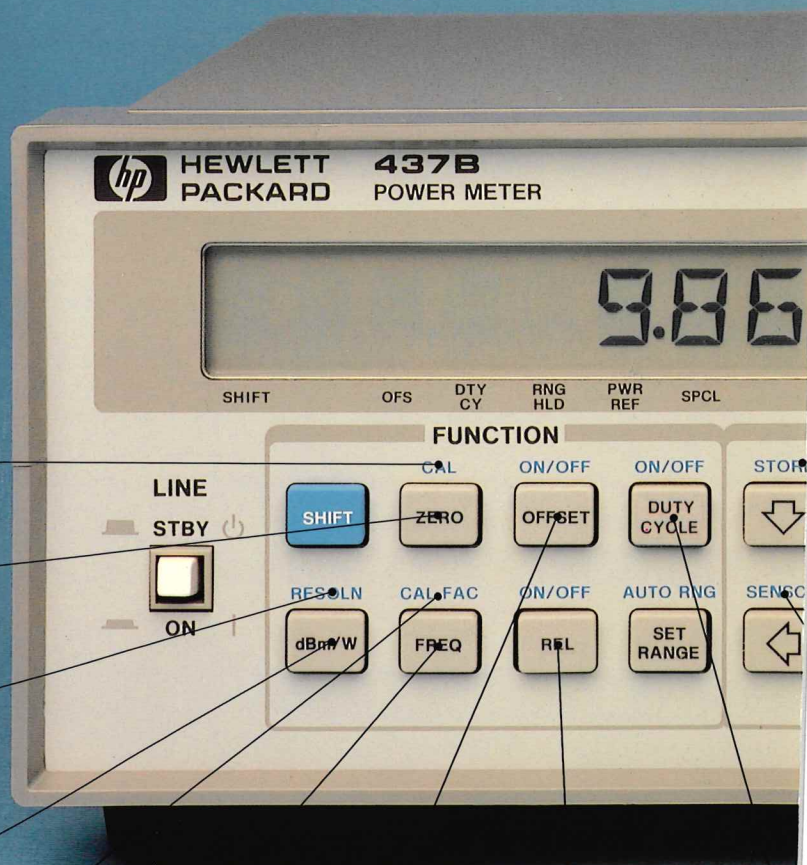
dBm / WATT
Selectable units of either watts or dBm in absolute power, and percent or dB for relative measurements.

CAL FAC
Cal Factor for frequency response correction from 1% to 150% with 0.1% resolution.

FREQ
Direct entry of test signal frequency instead of cal factor. Meter automatically selects the cal factor for the selected sensor.

OFFSET
Offset values from -99.99 dB to +99.99 dB provide for path loss or gain.

REL
Relative mode uses displayed value as reference when activated.



HP 437B — your best choice for manual...

Build Confidence in Your Power Measurement

The HP 437B Power Meter and HP 8480 series power sensors form a high precision, single channel, average power measurement system for characterizing devices, systems and subsystems. Exceptional meter linearity and low sensor SWR combine to give you outstanding measurement accuracy in demanding situations. Instrumentation accuracy is specified to be $\pm 0.5\%$ in linear mode or ± 0.02 dB in the logarithmic mode, making meter uncertainty a negligible part of your total measurement error.

Increase Your Productivity with an Easy-to-Use Meter

Push-button operation, modern features, and a logically organized and uncluttered front panel, make this meter easy to use in any application.

Automatic Calibration and Zeroing: Fully automatic digital zeroing in all five ranges eliminates zero carry-over and reduces zero drift. Simple key strokes provide accurate power sensor calibration using the 50 MHz internal reference oscillator.

Frequency Entry: Pre-loaded calibration factor versus frequency tables allow you to enter the frequency of your test signal instead of the Cal Factor. The meter uses interpolation to automatically calculate and use the best cal factor.

Automatic Sensor Recognition: Change the sensor and the HP 437B automatically recognizes the sensor type and not only displays the correct power, but flags overrange and underrange conditions.

Standard HP-IB: The HP 437B features standard HP-IB capability, making your transition from manual to automated or semiautomated tests easy.

Tailor the Configuration to Your Specific Needs

Microprocessor control in the HP 437B combines state-of-the-art accuracy with a modern and flexible feature set that allows you to customize the configuration to your specific application.

Rel and Offset: The HP 437B displays absolute power in linear (Watt) or logarithmic (dBm) units. By entering a power level as a reference, relative power can be measured in units of dB or percent. In addition, offsets can be entered from the front panel to display power levels corrected for external path or coupling loss or gain.

Resolution: Selectable resolution puts you in control of the tradeoff between measurement speed and display resolution. The meter's default resolution is 0.01 dB. For faster measurements, select 0.1 dB resolution, or choose 0.001 dB resolution for those applications where precise relative values need to be measured.

Duty Cycle: If you are using rectangular pulses (eg. radar applications), the duty cycle key provides you with a convenient peak power representation of the measured average power.

Set Range: The HP 437B has complete autoranging capability, but for those cases where you know the power range of your signal, the SET RANGE key gives you the ability to minimize range to range discrepancies.

Store/Recall: Ten store/recall registers are available to store the complete operating state of the meter for later recall. This allows for fast, easy and accurate changes from one measurement set up to another.

